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Report of the individual review of the annual submission of Estonia submitted in 2013*

* In the symbol for this document, 2013 refers to the year in which the inventory was submitted, and not to the year of publication.

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I. Introduction and summary

1. This report covers the review of the 2013 annual submission of Estonia, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 2 to 7 September 2013 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Ms. Anna Romanovskaya (Russian Federation) and Ms. Daniela Romano (Italy); energy – Mr. Ole-Kenneth Nielsen (Denmark), Mr. Aiden Kennedy (Ireland) and Mr. Kaleem Mir (Pakistan); industrial processes and solvent and other product use – Ms. Sina Wartmann (Germany) and Mr. Dusan Vacha (Czech Republic); agriculture – Mr. Etienne Mathias (France) and Mr. James Douglas MacDonald (Canada); land use, land-use change and forestry (LULUCF) – Ms. Inês Mourão (Portugal) and Mr. Raehyum Kim (Republic of Korea); and waste – Ms. Medeia Inashvili (Georgia) and Mr. Takefumi Oda (Japan). Ms. Inashvili and Mr. Nielsen were the lead reviewers. The review was coordinated by Mr. Matthew Dudley (UNFCCC secretariat).

2. In accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol" (decision 22/CMP.1) (hereinafter referred to as the Article 8 review guidelines), a draft version of this report was communicated to the Government of Estonia, which provided comments that were considered and incorporated, as appropriate, into this final version of the report. All encouragements and recommendations in this report are for the next annual submission, unless otherwise specified.

3. In 2011, the main greenhouse gas (GHG) in Estonia was carbon dioxide (CO_2), accounting for 89.9 per cent of total GHG emissions[1] expressed in CO_2 equivalent (CO_2 eq), followed by nitrous oxide (N_2O) (4.8 per cent) and methane (CH_4) (4.6 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) collectively accounted for 0.8 per cent of the overall GHG emissions in the country. The energy sector accounted for 89.1 per cent of total GHG emissions, followed by the agriculture sector (6.1 per cent), the industrial processes sector (2.9 per cent), the waste sector (1.9 per cent) and the solvent and other product use sector (0.1 per cent). Total GHG emissions amounted to 20,955.58 Gg CO_2 eq and decreased by 48.3 per cent between the base year[2] and 2011. The expert review team (ERT) concludes that the description in the national inventory report (NIR) of the trends for the different gases and sectors is reasonable.

4. Tables 1 and 2 show GHG emissions from sources included in Annex A to the Kyoto Protocol (hereinafter referred to as Annex A sources), emissions and removals from the LULUCF sector under the Convention and emissions and removals from activities under Article 3, paragraph 3, and, if any, elected activities under Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector and activity, respectively. In table 1, CO_2, CH_4 and N_2O emissions included in the rows under Annex A sources do not include emissions and removals from the LULUCF sector.

5. Additional background data on recalculations by Estonia in the 2013 annual submission, as well as information to be included in the compilation and accounting database, can be found in annex I to this report.

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[1] In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of CO_2 eq excluding LULUCF, unless otherwise specified.

[2] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The base year emissions include emissions from Annex A sources only.

Table 1

Greenhouse gas emissions from Annex A sources and emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, by gas, base year[a] to 2011

			Gg CO_2 eq							*Change (%)*
		Greenhouse gas	*Base year[a]*	*1990*	*1995*	*2000*	*2008*	*2009*	*2010*	*2011*	*Base year–2011*
Annex A sources		CO_2	36 635.00	36 635.00	17 981.46	15 143.30	17 357.71	14 157.89	17 801.49	18 832.99	–48.6
		CH_4	1 673.18	1 673.18	981.63	1 024.95	1 053.77	984.50	1 016.84	957.42	–42.8
		N_2O	2 233.95	2 233.95	1 046.55	901.65	1 073.49	979.61	1 016.05	1 003.97	–55.1
		HFCs	25.37	NA, NE, NO	25.37	69.54	131.31	138.15	152.56	159.38	528.3
		PFCs	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	0.04	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA
		SF_6	3.22	NA, NE, NO	3.22	2.73	1.35	1.44	1.81	1.82	–43.6
KP-LULUCF	Article 3.3[b]	CO_2					623.64	517.17	344.66	232.11	
		CH_4					0.00	0.00	0.00	0.00	
		N_2O					0.00	0.00	0.00	0.00	
	Article 3.4[c]	CO_2	NA				NA	NA	NA	NA	NA
		CH_4	NA				NA	NA	NA	NA	NA
		N_2O	NA				NA	NA	NA	NA	NA

Abbreviations: KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable, NE = not estimated, NO = not occurring.

[a] "Base year" for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

[c] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

Table 2
Greenhouse gas emissions by sector and activity, base year[a] to 2011

			Gg CO_2 eq							*Change (%)*
		Sector	*Base year[a]*	*1990*	*1995*	*2000*	*2008*	*2009*	*2010*	*2011*	*Base year–2011*
Annex A		Energy	35 956.90	35 956.90	17 596.48	14 770.96	16 745.77	14 129.73	17 767.99	18 661.63	–48.1
		Industrial processes	1 076.82	1 048.23	675.54	705.92	1 051.13	451.04	493.86	613.82	–43.0
		Solvent and other product use	26.44	26.44	26.02	26.76	21.96	18.49	17.39	18.86	–28.7
		Agriculture	3 166.84	3 166.84	1 483.71	1 203.70	1 329.85	1 230.60	1 256.59	1 270.52	–59.9
		Waste	343.72	343.72	256.49	434.83	468.96	431.72	452.94	390.76	13.7
		LULUCF	NA	–8 848.70	–10 596.46	1 099.71	–8 125.30	–7 342.13	–5 941.64	–4 262.81	NA
		Total (with LULUCF)	**NA**	**31 693.44**	**9 441.77**	**18 241.88**	**11 492.37**	**8 919.45**	**14 047.13**	**16 692.77**	**NA**
		Total (without LULUCF)	**40 570.73**	**40 542.14**	**20 038.23**	**17 142.17**	**19 617.67**	**16 261.58**	**19 988.77**	**20 955.58**	**–48.3**
		Other[b]	NA	NA	NA	NA	NA	NA	NA	NA	NA
KP-LULUCF	Article 3.3[c]	Afforestation and reforestation					–97.88	–121.26	–131.07	–145.01	
		Deforestation					721.53	638.44	475.74	377.12	
		Total (3.3)					**623.64**	**517.17**	**344.66**	**232.11**	
	Article 3.4[d]	Forest management					NA	NA	NA	NA	
		Cropland management	NA				NA	NA	NA	NA	NA
		Grazing land management	NA				NA	NA	NA	NA	NA
		Revegetation	NA				NA	NA	NA	NA	NA
		Total (3.4)	**NA**				**NA**	**NA**	**NA**	**NA**	**NA**

Abbreviations: KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NA = not applicable.

[a] "Base year" for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] Emissions/removals reported in the sector other (sector 7) are not included in Annex A to the Kyoto Protocol and are therefore not included in national totals.

[c] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

[d] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

II. Technical assessment of the annual submission

A. Overview

1. Annual submission and other sources of information

6. The 2013 annual inventory submission was submitted on 15 April 2013; it contains a complete set of common reporting format (CRF) tables for the period 1990–2011 and an NIR. Estonia also submitted the information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, accounting of Kyoto Protocol units, changes in the national system and in the national registry, and the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. The standard electronic format (SEF) tables were submitted on 15 April 2013. The annual submission was submitted in accordance with decision 15/CMP.1.

7. The full list of materials used during the review is provided in annex II to this report.

2. Overall assessment of the inventory

8. Table 3 contains the ERT's overall assessment of the annual submission of Estonia. For recommendations for improvements related to cross-cutting issues for specific categories, please see the paragraphs cross-referenced in the table.

Table 3
The expert review team's overall assessment of the annual submission

		General findings and recommendations
The expert review team's (ERT's) findings on completeness of the 2013 annual submission		
Annex A sources[a]	Complete	Mandatory: none
		Non-mandatory: "NE" is reported for potential emissions of HFCs and SF_6 (see para. 38 below) and CH_4 emissions from enteric fermentation for poultry (see para. 44 below)
Land use, land-use change and forestry[a]	Complete	Mandatory: none
		Non-mandatory: "NE" is reported for the carbon stock changes in unmanaged wetlands and in settlements remaining settlements, CH_4 and N_2O emissions from forest land, settlements and land converted to other land, and harvested wood products (see para. 56 below)
KP-LULUCF	Complete	None
The ERT's findings on recalculations and time-series consistency in the 2013 annual submission	Generally consistent	The ERT welcomes the inclusion of new categories (e.g. in the LULUCF sector); and the correction of identified errors (see table 9

		General findings and recommendations
		below)
The ERT's findings on verification and quality assurance/quality control procedures in the 2013 annual submission	Sufficient	The QA/QC procedures could be further improved, particularly in the LULUCF sector (see paras. 64 and 55 below)
The ERT's findings on the transparency of the 2013 annual submission	Sufficient	Estonia has improved the transparency of its annual submission (see paras. 17, 26, 41 and 59 below)

Abbreviations: Annex A sources = sources included in Annex A to the Kyoto Protocol, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NE = not estimated, QA/QC = quality assurance/quality control.

[a] The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* or the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry)*.

3. Description of the institutional arrangements for inventory preparation, including the legal and procedural arrangements for inventory planning, preparation and management

Inventory planning

9. The NIR and additional information provided by Estonia during the review described the national system for the preparation of the inventory. The Ministry of Environment (MoE) has overall responsibility for the national inventory, including the coordination of inventory preparation, the conclusion of formal agreements with inventory compilers and the approval of the submission and reporting to the UNFCCC secretariat. In collaboration with MoE, other organizations are also involved in the preparation of the inventory (the Climate Department of the Estonian Environmental Research Centre (EERC), the Estonian Environment Information Centre (EEIC) and Tallinn University of Technology (TUT)). EERC is responsible for the coordination of inventory preparation, the emission estimates and the compilation of the NIR, the implementation of a quality assurance/quality control (QA/QC) plan, the coordination of the review process, and the maintenance of the archiving system. EERC is contracted on a three-year basis (2011, 2012 and 2013) by MoE for the inventories for the industrial processes, solvent and other product use and waste sectors and on a one-year basis (2012) for the energy and agriculture sectors. EERC signed a contract with the Department of Chemistry at TUT for the preparation of the agriculture sector inventory for the 2013 annual submission. The LULUCF inventory and KP-LULUCF reporting are under the responsibility of the Department of the National Forest Inventory (NFI) at EEIC, which is a governmental organization and obliged to prepare the reporting by legal statute.

10. In response to a question raised by the ERT during the review, Estonia stated that a new contract had been signed between MoE and EERC for the 2014, 2015 and 2016 annual submissions. This new contract covers the preparation of the energy, industrial processes, solvent and other product use, agriculture and waste sector estimates, the general inventory coordination and QA/QC activities. EERC subcontracts TUT experts if needed. In the future, MoE is planning to use an external coordinator for the inventory management. The ERT acknowledges the efforts of Estonia to ensure ongoing inventory preparation through these contractual arrangements.

11. Most activity data (AD) used in the inventory are from Statistics Estonia (SE). In the NIR, Estonia reported that there is a bilateral agreement between MoE and SE. The main focus of the agreement is that MoE is obliged to present data regarding GHG emissions to SE, with both parties (MoE and SE) ensuring harmonized and consistent reporting in line with the requirements of the international statistical and environmental organizations. In response to a recommendation made in the previous annual review report, Estonia explored ways to strengthen the links between the GHG inventory compilers and SE, and agreed in joint meetings that inventory experts can contact the SE specialists directly. Additionally, and if necessary, a contract can be arranged to ensure that the required data that are not available in a public database (web-based) can be made available to inventory experts. The ERT acknowledges these improvements.

12. In response to a question raised by the ERT during the review, Estonia explained that data collection from other institutions, private companies, plants, non-governmental organizations and associations is undertaken by sectoral experts using personal contacts. Data on fluorinated gases (F-gases) will be collected in the future with the use of an online tool (logbook) that is mandated in a new government regulation on F-gas handling and reporting procedures and reporting formats. Hence, the dependence on personal contacts with companies will reduce over time. The ERT welcomes these improvements in the national system. The ERT concluded that the national system in Estonia functions in accordance with requirements in decision 19/CMP.1.

Inventory preparation

13. Table 4 contains the ERT's assessment of Estonia's inventory preparation process. For improvements related to specific categories, please see the paragraphs cross-referenced in the table.

Table 4
Assessment of inventory preparation by Estonia

		General findings and recommendations
Key category analysis		
Was the key category analysis performed in accordance with the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF)?	Yes	Level and trend analysis performed, including and excluding LULUCF
Approach followed?	Tier 2	
Were additional key categories identified using a qualitative approach?	No	
Has Estonia identified key categories for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol following the guidance on establishing the relationship between the activities under the Kyoto Protocol and the associated key categories in the	Yes	

		General findings and recommendations
UNFCCC inventory?		
Does Estonia use the key category analysis to prioritize inventory improvements?	Yes	
Are there any changes to the key category analysis in the latest submission?	Yes	Changes relate to the inclusion of carbon pools in the inventory (see paras. 55 and 56 below)
Assessment of uncertainty analysis		
Approach followed?	Tier 1	Uncertainty analysis performed, including and excluding LULUCF
Was the uncertainty analysis carried out in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF?	Yes	The ERT recommends that Estonia include explanations for the differences in the uncertainty estimates between annual submissions for total values in the general part of the NIR (section 1.7)
Quantitative uncertainty (including LULUCF)	Level = 33.4% Trend = 3.7%	
Quantitative uncertainty (excluding LULUCF)	Level = 24.9% Trend = 2.8%	

Abbreviations: ERT = expert review team, LULUCF = land use, land-use change and forestry, NIR = national inventory report.

Inventory management

14. Estonia has a centralized archiving system, which includes the archiving of disaggregated emission factors (EFs) and AD, and documentation on how these factors and data have been generated and aggregated for the preparation of the inventory. The archived information also includes internal documentation on QA/QC procedures, external and internal reviews, and documentation on annual key categories and key category identification and planned inventory improvements. The archive is kept by EERC. Estonia has informed the ERT about recent improvements in its archiving system, which now includes a folder where the inventory coordinator archives all documents related to the QA/QC checks. These include: QC checks performed by the sectoral experts and inventory coordinators; inventory coordinator documentation on checking the QC checks performed by the sectoral experts; QA checks performed by independent experts and comments of the sectoral experts and inventory coordinator on their results; comments received during the public review; comments made by different departments of MoE and other relevant institutions; and documentation on the comparison of inventory data with other data sources (e.g. European Union emissions trading scheme (EU ETS) and SE data). In response to a recommendation made in the previous annual review report, Estonia has stored all relevant materials in the single archive, which is in addition to the FTP (file transfer protocol) site. The ERT acknowledges the improvements made. During the review, the ERT was provided with all the requested additional archived information.

4. Follow-up to previous reviews

15. The ERT acknowledges that all recommendations made in the 2011 annual review report and most of the corresponding recommendations made in the 2012 annual review report have been addressed by Estonia.

16. The ERT noted that the completeness of the inventory has been improved, including in the industrial processes sector and the solvent and other product use sector (e.g. decommissioning emissions from refrigerated vehicles in transport refrigeration), as well as in the LULUCF sector (e.g. emissions and removals from mineral soils).

17. The transparency of the inventory has been enhanced across all sectors, including the energy sector (e.g. provision of background information on CH_4 and N_2O emission estimates using the COPERT IV model, and information on international bunker fuels); the industrial processes sector (e.g. justification for the use of the Intergovernmental Panel on Climate Change (IPCC) *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines) for consumption of halocarbons and SF_6); the agriculture sector (e.g. characteristics of livestock); the LULUCF sector (provision of AD for land-use changes and some explanations of the methodologies used for conversion of land); and the waste sector (provision of AD for waste disposal and justifications of the parameters used from the 2006 IPCC Guidelines).

18. Efforts have been made by Estonia to strengthen its national system (see paras. 9–12 above).

19. In response to recommendations made in the previous review report, Estonia has improved the quality of the inventory through the revision of AD and the development of country-specific EFs. This includes revised EFs for gaseous fuels in the energy sector, and biomass expansion factors (BEFs), EFs and area of drained soils in the LULUCF sector. In addition, Estonia has reallocated emissions relating to young cattle and N_2O emissions from human sewage in wastewater handling. With regard to KP-LULUCF, Estonia has revised the area data, developed country-specific EFs for dead wood and implemented as an interim measure the Swedish EFs for the litter and mineral soil carbon pools, revised the BEF value for growing stocks for afforestation and reforestation (A/R) activities, and revised the EFs for the litter, mineral and organic soil carbon pools for deforestation.

20. Estonia plans to implement the following recommendations made in the 2012 review report in its 2014 annual submission: review the constant EF used to estimate fugitive CH_4 emissions from natural gas (see para. 36 below); update the uncertainty values for the CO_2 EF for solid fuels reported under public electricity and heat production; improve the transparency of the LULUCF inventory with regard to a methodology to estimate the carbon stock changes in land converted to other land; assess the impact of the different forest definitions as they relate to afforested and reforested land and correct the area data where appropriate; and identify alternative data to complement the NFI to detect deforestation activities.

5. Areas for further improvement identified by the expert review team

21. During the review, the ERT identified a number of areas for improvement, including some related to specific categories. These are listed in the relevant chapters of this report and in table 8 below.

B. Energy

1. Sector overview

22. The energy sector is the main sector in the GHG inventory of Estonia. In 2011, emissions from the energy sector amounted to 18,661.63 Gg CO_2 eq, or 89.1 per cent of total GHG emissions. Since 1990, emissions have decreased by 48.1 per cent. The key drivers for the fall in emissions are the economic structural changes in line with the transition from a planned economy to a market economy, which resulted in a decline in emissions from the categories energy industries, manufacturing industries and construction, transport, other sectors and fugitive emissions. Within the energy sector, 79.7 per cent of the emissions were from energy industries, followed by 12.1 per cent from transport, 4.2 per cent from manufacturing industries and construction, 3.4 per cent from other sectors and 0.4 per cent from fugitive emissions from oil and natural gas. The category other accounted for 0.1 per cent of total emissions from the energy sector.

23. With regard to the EFs for CO_2 emissions from fuel combustion (all fuels), the NIR lists many EFs as country-specific, using the reference "CS, LT = D". In response to a question raised by the ERT during the review, Estonia explained that the IPCC default EF used by Lithuania was applied in Estonia and considered a country-specific EF. The ERT disagrees with this approach and recommends that Estonia update the references.

24. With regard to liquefied petroleum gas (LPG), Estonia uses the IPCC default CH_4 and N_2O EFs for gaseous fuels. The ERT agrees that the emission properties of LPG are closer to those of natural gas than to oil products. However, the ERT noted that Estonia used the oxidation factor for liquid fuels rather than for gaseous fuels. The ERT considers that the oxidation factor for gaseous fuels is more applicable, considering the physical properties of LPG. In response, Estonia indicated that this will be changed in the next annual submission. The ERT recommends that Estonia change the oxidation factor for LPG and recalculate the entire time series.

2. Reference and sectoral approaches

25. Table 5 provides a review of the information reported under the reference approach and the sectoral approach, as well as comparisons with other sources of international data. Issues identified in table 5 are more fully elaborated in paragraphs 26 and 27 below.

Table 5
Review of reference and sectoral approaches

		Paragraph cross-references
Difference between the reference approach and the sectoral approach	Energy consumption: –11.55 PJ, –5.2% CO_2 emissions: 410.37 Gg CO_2 eq, 2.2%	
Are differences between the reference approach and the sectoral approach adequately explained in the NIR and the CRF tables?	Yes	
Are differences with international statistics adequately explained?	No	26, 27

Is reporting of bunker fuels in accordance with the UNFCCC reporting guidelines?	Yes
Is reporting of feedstocks and non-energy use of fuels in accordance with the UNFCCC reporting guidelines?	Yes

Abbreviations: CRF = common reporting format, NIR = national inventory report, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

Comparison of the reference approach with the sectoral approach and international statistics

26. Estonia described the differences between the reference approach and the sectoral approach in the NIR. The explanations provided address the differences in a transparent manner. In addressing a recommendation made in the previous review report, the Party has improved the reporting of the apparent energy consumption data. The ERT commends Estonia for this improvement.

27. During the previous review, the ERT recommended that Estonia improve the consistency between the data reported to the International Energy Agency (IEA) and the data reported in the CRF tables. During the review of the 2013 annual submission, a number of discrepancies were identified. In response to questions raised by the ERT, Estonia explained that the discrepancies were mainly in the CRF data and were caused by some values being updated in accordance with the results of a joint questionnaire by SE but not being updated in the CRF tables. The discrepancies are for different years of the time series prior to 2008. The ERT reiterates the recommendation made in the previous review report that Estonia improve the consistency between the data reported to IEA and the data gathered by SE.

International bunker fuels

28. No problems were identified.

Feedstocks and non-energy use of fuels

29. No problems were identified.

Country-specific issues

30. The main domestic fuel in Estonia is oil shale. Oil shale is both combusted directly for the production of electricity and heat and as feedstock for the production of shale oil. Previous review reports have recommended that Estonia prepare carbon balances for shale oil production. The carbon balances were not included in the 2013 NIR due to confidentiality, but were provided to the ERT for the purposes of the review. Regarding the carbon balance, the normal procedure is to calculate the carbon inputs (oil shale) and outputs (shale oil, semi-coke, generator gas, etc.) and then to compare the two figures. In the carbon balance provided by Estonia, the carbon is calculated for most fuel streams, but for the last output fuel the carbon content is calculated as the input minus all other output carbon. This has the effect that the IEF for the last fuel stream for all three plants is highly variable and it also means that the output will always precisely match the input. The ERT considers that the process as described could lead to fugitive emissions that are not captured by the current approach. Therefore, the ERT recommends that Estonia collect data on the carbon content of all fuel streams and prepare the carbon balance to verify that no fugitive losses occur during the process. Furthermore, the ERT recommends that Estonia translate the first column of the carbon balance spreadsheet into English to facilitate the review.

3. Key categories

Stationary combustion: solid fuels – CO_2

31. With regard to the EFs for CO_2 emissions from fuel combustion (solid fuels), the NIR states that a comparison of CO_2 EFs has been undertaken with corresponding plant-specific EFs reported under the EU ETS. Upon request from the ERT, Estonia provided the comparison. It showed rather large differences in the carbon content between the inventory data used and the EU ETS reporting, with the inventory having the higher values. Estonia explained that oil shale gases are chemically very uneven fuels and that it was probable that the data sent by the companies for inventory preparation are not exactly the same data that are used for the EU ETS calculations. The ERT acknowledges that these fuels will be uneven in composition over the year. The ERT recommends that Estonia provide information on the measurement requirements for the plants under the EU ETS and information on why the plants have reported different values to the inventory compilers and the EU ETS.

Road transportation: liquid fuels – CO_2

32. The previous review report recommended that Estonia calculate the weighted average of the country-specific CO_2 EFs from the import countries and apply this as the CO_2 EFs. Estonia has implemented the recommendation and the ERT commends Estonia for this improvement. During the review, the ERT requested to see the underlying data used to calculate the weighted CO_2 EFs for gasoline and diesel oil. When examining the data, the ERT noticed that there were unusual values regarding the carbon content for some countries, namely, Norway (diesel oil), Ukraine (gasoline) and Belarus (gasoline). While the EFs were correctly referenced at the time of the preparation of the annual submission, it is clear to the ERT that these EF values are incorrect. Since very small amounts were imported from the above-mentioned countries the significance for the emissions was negligible. The ERT recommends that Estonia in the future apply QC checks to the data and investigate any unusual values. Furthermore, the ERT recommends that Estonia provide in the NIR the information used to calculate the weighted EFs for the most recent year.

4. Non-key categories

Civil aviation: liquid fuels – CO_2

33. Estonia reported different CO_2 EFs for aviation gasoline for landing and take-off cycles (LTOs) and cruise modes. It is unlikely that the CO_2 EF would vary significantly between flying modes. In response to a question raised by the ERT during the review, Estonia stated that the EFs are from the EMEP/EEA Guidebook.[3] The ERT noted that the guidebook provides EFs in kg/LTO for LTOs and kg/t for cruise. When converting the LTO EFs using the fuel consumption per LTO reported in the guidebook, the guidebook provides the same EF in kg/t as for cruise. The ERT therefore considers that Estonia is overestimating emissions from LTOs. The ERT recommends that Estonia revise the CO_2 EF for LTOs.

Road transportation: liquid fuels – CH_4 and N_2O

34. The previous review report noted that there were significant inter-annual fluctuations in the implied emission factors (IEFs) for road transportation and recommended that Estonia improve its explanation of this in the NIR. In the 2013 annual submission, no improvements have been made in relation to this recommendation. The

[3] <http://www.eea.europa.eu/themes/air/emep-eea-air-pollutant-emission-inventory-guidebook>.

ERT considers that in general the description of the trends in the NIR related to the AD, IEFs and emissions could be improved. As examples, the ERT noted that the CH_4 IEF for diesel oil used in road transportation decreased significantly from 2010 (5.01 kg/TJ) to 2011 (2.67 kg/TJ) and that the number of vehicles increased between 1991 and 1992 by 8.6 per cent, while the kilometres driven decreased by 52.8 per cent. During the review, Estonia provided explanations for the different observed fluctuations. The ERT recommends that the Party improve the trend discussion in the NIR, focusing on the key categories.

Fugitive emissions: oil – CH_4

35. Estonia estimates CH_4 emissions from transport and storage of oil. However, the IPCC default EFs used are for crude oil and it is not usually considered that CH_4 emissions occur from refined products. Since there is no oil refining in Estonia, it would be unusual for there to be transport and storage of crude oil. In response, the Party clarified that the AD used in the calculation were for refined oil products and not crude oil. Estonia also informed the ERT that a study is planned to investigate the possible emissions from this subcategory. The ERT noted that both the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines) and the 2006 IPCC Guidelines consider CH_4 emissions from the distribution of refined oil products as not applicable. The EF currently used by Estonia is leading to a probable overestimation of emissions. The ERT recommends that Estonia report the notation key "NO" (not occurring) in CRF table 1.B.2 for oil transport (1.B.2.a.iii) and oil refining/storage (1.B.2.a.iv), since the transport, refining and storage of crude oil does not occur in Estonia. Furthermore, the ERT recommends that Estonia change the notation key for distribution of oil products (1.B.2.a.v) as it does occur in Estonia.

Fugitive emissions: natural gas – CH_4

36. Estonia uses an EF from Finland for the calculation of emissions from natural gas distribution. During the review, the ERT sought further clarification from the Party regarding the applicability of the Finnish EF in Estonia. In response, Estonia provided the ERT with data from the natural gas distribution company (Eesti Gaas) for 2010 and 2011, which showed that the Party currently overestimates the emissions. Estonia also informed the ERT that data were not available for the years 1990–2009. The ERT noted that emissions from natural gas distribution are often related to maintenance work, accidents, etc. This means that it will be unlikely that a trend extrapolation can be used. The ERT recommends that as data become available for future years, Estonia assess the possibility of revising the EF, taking into consideration the importance of time-series consistency.

C. Industrial processes and solvent and other product use

1. Sector overview

37. In 2011, emissions from the industrial processes sector amounted to 613.82 Gg CO_2 eq, or 2.9 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 18.86 Gg CO_2 eq, or 0.1 per cent of total GHG emissions. Since 1990, emissions have decreased by 41.4 per cent in the industrial processes sector and by 28.7 per cent in the solvent and other product use sector. The key drivers for the fluctuations in emissions in the industrial processes sector are economic activity, closures and refurbishments of/at industrial production sites and the increased demand for F-gases as a replacement for ozone-depleting substances. Economic activity strongly receded between 1990 and 1993, picking up again from 1994 onwards and was affected by the economic recession in 2009. Furthermore, the refurbishment of the only ammonia production plant in the country lead to a decrease in emissions in 2002 and 2003. The plant has not produced ammonia since 2009. Emissions from cement production increased from 2007 onwards due

to an extension of the production capacities. There is no clear trend in the emissions development of the industrial processes sector – while the emissions for 2011 are considerably lower than the base year emissions, the two years before the economic crisis in 2009 show emission levels similar to the base year, and 2010 and 2011 show a strong upward trend. In the solvent and other product use sector, emissions have also fluctuated, the main driver being economic activity. Within the industrial processes sector, 73.7 per cent of the emissions were from mineral products, followed by 26.3 per cent from the consumption of halocarbons and SF_6. Emissions from metal production and chemical production do not occur.

38. Estonia reported potential emissions of HFCs, PFCs and SF_6 as "NO" or "NE" (not estimated). In response to a question raised by the ERT during the review, Estonia indicated that it does not see a reason to report potential emissions because it reports actual emissions. In order to increase the transparency and comparability of the reporting, as well as to check actual estimates, the ERT again reiterates the encouragement made in the previous review report that Estonia provide estimates for the potential emissions of these gases.

2. Non-key categories

Other (mineral products) – CO_2

39. The ERT noted that emissions from the consumption of carbonates are determined using country-specific EFs under cement and lime production, while the 2006 IPCC Guidelines default values are used for glass production (for container glass the Revised 1996 IPCC Guidelines are used) as well as for bricks and tiles production and lightweight gravel production. Estonia indicated that the development of a country-specific EF was considered for glass production, but it did not see the rationale for developing country-specific EFs for bricks and tiles production as this category was not among the key categories. The ERT encourages the Party to pursue its consideration of developing a country-specific EF for glass production, particularly considering that only one production facility exists. Furthermore, the ERT encourages Estonia to assess available information on carbonate composition at the national level as well as in neighbouring Parties which could be considered for the development of a country-specific EF for bricks and tiles as well as lightweight gravel.

D. Agriculture

1. Sector overview

40. In 2011, emissions from the agriculture sector amounted to 1,270.52 Gg CO_2 eq, or 6.1 per cent of total GHG emissions. Since 1990, emissions have decreased by 59.9 per cent. The key drivers for the fall in emissions are the decrease in the livestock population and the decrease in the amount of synthetic fertilizer and manure applied to soils. Within the sector, 55.9 per cent of the emissions were from agricultural soils, followed by 32.3 per cent from enteric fermentation and 11.8 per cent from manure management. N_2O accounted for 64.1 per cent and CH_4 accounted for 35.9 per cent of emissions.

41. Many improvements were made to the NIR in the most recent submission; the ERT commends Estonia for its efforts to improve the accuracy of the calculations and the transparency of the explanations. The previous ERT noted that not all CRF tables and data were fully explained and referred to in the NIR. The ERT considers that the NIR of the 2013 annual submission contains sufficient detail and provides most of the essential data and explanations. The ERT commends Estonia for the improvement.

42. During the review, the ERT identified several small discrepancies without impacts on the calculations but due to incorrect reporting in the CRF tables (e.g. incorrect copy and paste). The ERT encourages Estonia to identify the actual reasons for this type of error in its reporting and encourages the Party to enhance its QC checks if this is recognized as responsible for these weaknesses.

43. The uncertainty estimates have been implemented according to the tier 1 method presented in the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance). In spite of the fact that tier 2 methods are used for the calculation of emissions from most of the key categories related to livestock, default uncertainty values have been used for most parameters. The ERT encourages Estonia to investigate the possibility of using more country-specific data for the uncertainty estimates in relation to the calculations that are actually implemented.

2. Key categories

Enteric fermentation – CH_4

44. Estonia reported CH_4 emissions from enteric fermentation for poultry as "NE". The ERT notes that although there is no methodology in the Revised 1996 IPCC Guidelines or in the IPCC good practice guidance, it encourages Estonia to estimate the emissions.

45. For fur-bearing animals, Estonia has used an EF from Norway, since no IPCC default value is available; this value is used by different Nordic countries but can depend on the type of animal (mink, fox, etc.). The previous ERT encouraged the Party to examine the possibility of developing country-specific EFs for fur-bearing animals, but Estonia responded that due to the low level of emissions and the lack of resources this encouragement was not implemented in the 2013 annual submission. The ERT reiterates the previous encouragement that the Party develop country-specific EFs for fur-bearing animals but considers that this minor issue could be resolved by comparing the types of animals that were used to develop the Norwegian EF with the fur-bearing animals that are bred in Estonia.

46. The ERT noted that, in response to a previous recommendation, the NIR has been improved regarding the characteristics of non-dairy cattle, such as animal weights and CH_4 conversion factors. The ERT commends Estonia for increasing the transparency of its reporting in its 2013 annual submission.

47. In the 2012 annual submission, Estonia reported cattle (aged one to two years) under the subcategory mature, which was not in accordance with the IPCC good practice guidance. This was raised by the previous ERT; Estonia has implemented the recommendation and has reported bovine cattle (aged one to two years) under the subcategory young cattle in the 2013 annual submission. The ERT commends Estonia for improving its reporting.

48. In the 2012 annual submission, the calves that are milk-fed were not excluded from the enteric fermentation calculations. This was identified by the previous ERT as an overestimation of emissions insofar as it is proved that these young animals do not emit CH_4. The recommendation to apply a CH_4 conversion rate of zero for the milk-fed period of calves was followed by Estonia and has led to recalculations in the 2013 annual submission. The ERT commends Estonia for improving the calculations for enteric fermentation.

Manure management – CH_4 and N_2O

49. In response to a question raised by the ERT during the review regarding manure management allocation, Estonia recognized that there was an omission in the reporting of

the allocation structure of manure management systems for swine in CRF table 4.B(a). However, the omission does not affect the calculation of emissions. The ERT recommends that Estonia amend this incorrect reporting.

50. In response to a question raised by the ERT during the review regarding the nitrogen (N) excretion calculation, Estonia recognized that there was a copy and paste omission in the reporting of the N excretion values for dairy cattle and fur-bearing animals in CRF table 4.B(b). However, the omission does not affect the calculation of emissions. The ERT recommends that Estonia amend this incorrect reporting.

51. In response to a question raised by the ERT during the review regarding the sharp increase in N excretion for dairy cattle between 2007 and 2008, Estonia explained that this trend is due to the combined effect of the sharp increase in the milk yield between 2007 and 2008 and the use of milk yield dependent values for the N content in cattle feed. The N content in food values is based on an Estonian publication (Kaasik et al., 2002).[4] According to this publication, the N content in cattle feed is about 2.3 per cent for cows producing less than 6,900–7,000 kg of milk per year; and 2.4 per cent for cows producing more than 6,900–7,000 kg of milk per year. The ERT considers that this explanation is satisfactory and commends Estonia for using a dynamic value for the N content in cattle feed, which is reliable information. However, the ERT also encourages Estonia to investigate the possibility of smoothing this effect, which appears to be a threshold effect and may not be in line with good practice. The ERT recommends that the Party increase the transparency of this issue by explaining the trend of N excretion for dairy cattle in the NIR. The ERT also recommends that Estonia report the fact there is dynamic N content in the feed of dairy cattle, which is not currently the case, in appendix A.3.3_V of the NIR.

Agricultural soils – N_2O

52. In response to a question raised by the ERT during the review regarding N excretion on pasture, Estonia recognized that there was an omission in the reporting of AD for pasture in CRF table 4.D for 2011. However, the omission does not affect the calculation of emissions. The ERT recommends that Estonia amend this incorrect reporting.

53. Estonia plans to develop a more accurate value for the parameter fraction of total above-ground crop biomass that is removed from the field as a crop product ($Frac_R$). The ERT recommends that Estonia revise its estimate of $Frac_R$ on the basis of national studies.

E. Land use, land-use change and forestry

1. Sector overview

54. In 2011, net removals from the LULUCF sector amounted to 4,262.81 Gg CO_2 eq. Since 1990, net removals have decreased by 51.8 per cent. The key driver for the decrease in removals is the increased harvest rate in forest land remaining forest land. Due to the comparatively intensive use of forest resources, the carbon flows derived from the forest land category have a major influence on the LULUCF sector's total carbon balance. The LULUCF sector is a net source of emissions in some years (2000–2003) and a net sink of carbon in all other years of the time series. Within the sector, net removals of 5,161.67 Gg CO_2 eq were from forest land remaining forest land, followed by 118.09 Gg CO_2 eq from land converted to grassland and 22.48 Gg CO_2 eq from land converted to forest land. Grassland remaining grassland accounted for net emissions of 400.38 Gg CO_2 eq and land

[4] Jaknin E, Goltsova N, Tomilina O, Kaasik M, Sõukand Ü and Hongisto, M. 2002. Atmospheric depositions on the north-eastern areas of Estonia and in the west of Leningrad district (based on the data of snow cover), *Ecological Chemistry*, 11(3): pp. 145–156 (in Russian, summary in English).

converted to settlements accounted for 262.01 Gg CO_2 eq. The remaining net emissions of 377.04 Gg CO_2 eq were from all other categories within the sector.

55. The ERT noted that the LULUCF sector has been subject to substantial improvement since the previous annual submission. This is a result of the Party addressing the recommendations made in the previous review report with regard to completeness and accuracy. The ERT commends the efforts of Estonia in this regard. Improvements include the reporting of emissions and removals from mineral soils, a correction of the application of the carbon stock change methods, and the use of factors from neighbouring countries as an interim measure until country-specific values for the key categories can be developed.

56. The reporting of the LULUCF sector is generally complete, with GHGs and land uses considered, as well as most carbon pools. With regard to the carbon pools, Estonia has not reported the losses from the carbon stock changes in living biomass except for forest land remaining forest land and other land converted to forest land. Gains and losses could be reported separately for above- and below-ground biomass for the sake of transparency when it is technically possible to separate information on gains and losses. The ERT encourages Estonia to separate gains and losses for all land uses, where possible.

57. The ERT identified an inconsistent use of the notation keys: "NE" was reported when the notation key "NA" (not applicable) would apply with regard to the reporting of land-use conversion to cropland. The ERT recommends that Estonia use the notation key "NA".

58. The ERT encourages Estonia to explore means of enhancing the comparability of its inventory by using the annotated outline of the NIR as a basis for its annual submission; this will also improve the completeness of the reporting of information. The ERT noted that this relates to the LULUCF reporting under both the Convention and the Kyoto Protocol, with the information requirements of each included in the above-mentioned annotated outline of the NIR.

59. The ERT noted that the transparency of the LULUCF reporting in the 2013 annual submission has been improved by the inclusion of information in the NIR on the assumptions, values and methodologies used. However, the ERT also noted that the transparency could be further enhanced by providing information on gains and losses for the carbon stock balances, and not only the net changes where technically possible. The ERT reiterates the recommendation made in the previous review report that Estonia provide more detailed information on the methodology used to estimate the carbon stock changes in any land converted to other land in the NIR.

60. The ERT also noted that various forest definitions are referred to in the NIR. The ERT encourages Estonia to report only on the definition that is used in both the Convention and the KP-LULUCF reporting, and ensure that this definition is applied consistently.

61. In response to a question raised by the ERT during the review, Estonia provided information on its capacity to detect the exact year of an occurrence of land-use change and its subsequent consistent representation in the time series. The ERT identified that this is achieved by combining NFI data with older maps and aerial photographs (see NIR chapter 7.1.3). The ERT recommends that Estonia include the information referred to above, and also report on any developments in identifying the exact year of the occurrence of land-use change.

62. The ERT noted that the NFI has an annual sampling area that could be deemed as insufficient to detect small deforested and afforested areas. The NIR states that there is no alternative source of information that can be used. The ERT encourages Estonia to explore available means to determine these areas and related parameters (such as country-specific EFs) that can increase the accuracy of the emission and removal estimates.

63. With respect to soils, Estonia continues to state its intention to conduct a study on country-specific EFs. In response to a question raised by the ERT during the review, the Party explained that this study had not been undertaken due to the lack of resources necessary to support the fieldwork and corresponding analyses to enable the development of country-specific EFs related to harvesting on soils. As an interim measure, Estonia has elected to use EFs from either Sweden or the 2006 IPCC Guidelines. Moreover, the Party indicated to the ERT that a review of the impact of harvest activities on soil emissions based on studies from neighbouring countries (Finland, Sweden) is being prepared. The ERT is of the view that this review could potentially provide an informed basis for further research on this matter, and the ERT commends Estonia for this initiative. The ERT encourages Estonia to explore ways of estimating the impact of high harvest levels on forest soil emissions by initiating a national study or by validating current data by means of QA or verification checks, and that Estonia outline the progress made in this regard in the NIR.

64. The ERT noted that the time-series consistency of some AD was raised as an issue in the previous review report. These data cover high inter-annual variations (as in the case of harvest volumes, deforestation or forest land converted to other land-use classes or mass of lime applied). The ERT recommends that the Party subject these data to further assessment by either QA or verification checks (or alternative means), and that Estonia report thereon in the NIR.

65. The ERT noted that category-specific QA/QC and verification checks are referred to in the NIR and that Estonia applied tier 1 procedures. The ERT encourages Estonia to apply tier 2 QC, QA and verification procedures at least to those land uses identified as key categories and report the results in the NIR. Also, for QA/QC purposes, the ERT encourages the Party to include a summary table consisting of a comparison matrix of the Convention and KP-LULUCF reporting areas and explain any major differences.

2. Key categories

Forest land remaining forest land – CO_2

66. The ERT concurred with a finding in the previous review report (FCCC/ARR/2012/EST, para. 98) that the level of harvest volumes and wildfires cannot directly explain the observed large inter-annual variability in the carbon stock changes in living biomass. In response to a question raised by the ERT during the review, Estonia explained that the living biomass is calculated via the growing stock, with data obtained from the NFI. However, the NFI sample includes sampling errors that cause variations in the estimate. Smoothing is applied by Estonia to the carbon stock per hectare per year, resulting in the time series of carbon stock changes in biomass smoothed with multiple degree polynomials to reduce some differences (statistical errors) between successive years and in the estimates of the carbon stock changes. The ERT reiterates the recommendation in the previous annual review report that Estonia explore ways of reducing the inter-annual fluctuations and report thereon in its annual submission.

3. Non-key categories

Agricultural lime application – CO_2

67. The ERT identified that emissions from lime application vary considerably in the time series, and are near zero for some years. In response to a question raised by the ERT during the review, Estonia provided the complete time series and explanations for the variations. The ERT concluded that the time-series issue is resolved.

F. Waste

1. Sector overview

68. In 2011, emissions from the waste sector amounted to 390.76 Gg CO_2 eq, or 1.9 per cent of total GHG emissions. Since 1990, emissions have increased by 13.7 per cent. The key drivers for the rise in emissions are the changes in the management practices at solid waste disposal sites and the increase in the amount of waste composted. Within the sector, 65.1 per cent of the emissions were from solid waste disposal on land, followed by 24.6 per cent from biological treatment (composting) of waste and 10.3 per cent from wastewater handling.

69. The inventory for the waste sector is generally transparent and complete in terms of gases and categories. The estimation methodologies are transparently documented in the NIR with well-organized tables for the AD, EFs and other parameters. The ERT commends Estonia for addressing the recommendations made in the previous review report in relation to improving the methods used to estimate solid waste disposal on land, wastewater handling and waste incineration (see paras. 72 and 73 below). The ERT concluded that these revisions have improved the quality of the inventory for the waste sector.

2. Key categories

Solid waste disposal on land – CH_4

70. Estonia has used the IPCC first order decay method to estimate emissions from solid waste disposal on land, and default parameters from both the IPCC good practice guidance (methane correction factor, degradable organic carbon (DOC) dissimilated, oxidation factor) and from the 2006 IPCC Guidelines (CH_4 generation constant, DOC for each waste type). In response to a recommendation made in the previous review report, Estonia has included in its NIR information on the amount of waste disposed on land for the entire time series.

71. In its 2013 annual submission, Estonia reported emissions from the category "uncategorized disposal site". However, the ERT found that information on this category and the reasons as to why this category is reported and its definition were missing. In response to a question raised by the ERT during the review, Estonia provided the necessary information. The ERT recommends that the Party include this information in the NIR.

72. In response to a recommendation made in the previous review report, Estonia has revised the waste distribution by waste management type relating to deriving the methane correction factors, and revised the flared biogas deducted from CH_4 recovery. The ERT commends Estonia for these improvements.

Wastewater handling – N_2O

73. In response to a recommendation made in the previous review report, Estonia has reported N_2O emissions only from human sewage in line with the IPCC good practice guidance by discounting the emissions from domestic and commercial wastewater (without human sewage) to avoid double counting. The ERT commends Estonia for this improvement.

3. Non-key categories

Wastewater handling – CH_4

74. Estonia estimated CH_4 emissions from domestic and commercial wastewater using a tier 1 method and a maximum methane producing capacity (Bo) value from the Revised 1996 IPCC Guidelines, and country-specific EFs. In response to a question raised by the

ERT during the review, the Party provided information on the country-specific methane conversion factor used to estimate the emissions. The ERT recommends that Estonia include this information in the NIR. The ERT also noted that Estonia has used a Bo value from the Revised 1996 IPCC Guidelines that is lower than the default value contained in the IPCC good practice guidance. In response to a question on this matter, the Party provided information in support of the use of the lower Bo value. The ERT recommends that Estonia include this information in the NIR.

G. Supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol

1. Information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

Overview

75. Table 6 provides an overview of the information reported and parameters selected by Estonia under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

Table 6
Supplementary information reported under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

		Specific findings and recommendations
Has Estonia reported information in accordance with the requirements in paragraphs 5–9 of the annex to decision 15/CMP.1?	Not sufficient	No information on factoring out was provided in the 2013 annual submission. In response to a question raised by the ERT during the review, this information was provided. Information was also provided to the ERT on the year of the onset of any activities, on the methodologies used for reporting land converted to other land uses, and on the units of afforestation/reforestation harvested since the beginning of the commitment period
Identify any elected activities under Article 3, paragraph 4	Activities elected: none Years reported: none	
Identify the period of accounting	Commitment period accounting	
Assessment of Estonia's ability to identify areas of land and areas of land-use change	Sufficient	The ERT recommends that Estonia include in its annual submission all information gaps in reporting listed above in this table

Activities under Article 3, paragraph 3, of the Kyoto Protocol

Afforestation and reforestation – CO_2

76. As mentioned in paragraph 59 above, Estonia continues not to report the gains and/or losses in carbon stock changes for the carbon pools. The ERT encourages Estonia to report both gains and losses for all carbon pools and activities where technically possible.

77. The ERT identified that the net carbon stock change in dead wood is reported as "NO" for units of A/R. In response to a request made by the ERT during the review to provide transparent and verifiable information to demonstrate that the pool is not a net source of emissions, Estonia replied that the NFI data reveal that no dead wood is present in afforested and reforested areas, and that the pool would be a sink with regard to tree

growth. The ERT acknowledges this explanation but recommends that Estonia demonstrate this assumption through the provision of transparent and verifiable information showing that the pool is not a net source in its NIR.

78. The ERT identified that Estonia did not report units of land harvested in A/R activities since the beginning of the commitment period. In response to a question raised by the ERT during the review, the Party provided information (i.e. justification) stating that taking into account reasonable resources for tracking A/R units (NFI) and available data, there is no evidence of harvesting on A/R areas. Furthermore, the trees on A/R areas could be (a maximum of) 22 years old, hence it is not profitable (little stem volume) to harvest a forest of this age. The ERT recommends that Estonia include the information mentioned above in its NIR, including verifiable information that is sufficient (and transparent) in justifying that the carbon pool is not a net source of emissions.

Afforestation, reforestation and deforestation – CO_2

79. In the previous review report, the ERT noted that since the values of the area of afforestation have been obtained for the total forest area, the real difference related to different forest definitions during the detection of small and scattered events such as A/R or deforestation (D) may be actually higher. In response to a question raised by the ERT on this matter, Estonia agreed and explained that the NFI is the only current source of information, and that there are no alternative land-use statistics that can be used to detect deforestation areas. Further, the Party explained that harvesting permits do not differentiate between forest and other land, and the land cadastre data have been static since 1991. The ERT recommends that Estonia assess the impact of the application of different forest definitions, specifically for afforested and reforested land, and utilize the results of this assessment to correct the area of ARD obtained from the SE data, and report thereon in the NIR.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

80. Estonia has reported information on its accounting of Kyoto Protocol units in the required SEF tables, as required by decisions 15/CMP.1 and 14/CMP.1. The ERT took note of the findings and recommendations included in the standard independent assessment report (SIAR) on the SEF tables and the SEF comparison report.[5] The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10.

81. Information on the accounting of Kyoto Protocol units has been prepared and reported in accordance with decision 15/CMP.1, annex, chapter I.E, and reported in accordance with decision 14/CMP.1 using the SEF tables. This information is consistent with that contained in the national registry and with the records of the international transaction log (ITL) and the clean development mechanism registry and meets the requirements referred to in decision 22/CMP.1, annex, paragraph 88(a–j).

Calculation of the commitment period reserve

82. Estonia has reported the information on its commitment period reserve in its 2013 annual submission. Estonia reported its commitment period reserve to be 104,777,884 t CO_2 eq based on the national emissions in its most recently reviewed inventory (five times 20,955,576.877 Gg CO_2 eq). The ERT agrees with this figure.

[5] The SEF comparison report is prepared by the international transaction log (ITL) administrator and provides information on the outcome of the comparison of data contained in the Party's SEF tables with corresponding records contained in the ITL.

3. Changes to the national system

83. Estonia reported in the NIR changes to its national system since the previous annual submission, and provided the ERT with additional information during the review on these changes. MoE concluded a one-year contract for the preparation of the inventory for the energy and agriculture sectors in 2012 for the first time. EERC signed a contract with the Department of Chemistry at TUT for the preparation of the agriculture sector inventory for the 2013 annual submission. In response to a question raised by the ERT during the review, Estonia stated that a new contract has been signed between MoE and EERC for the 2014, 2015 and 2016 annual submissions. The contract covers the preparation of the energy, industrial processes, solvent and other product use, agriculture and waste sector estimates, general inventory coordination and QA/QC activities. The ERT found these changes positive and aimed at strengthening the national system. The ERT concluded that, taking into account the confirmed changes in the national system, Estonia's national system continues to function in accordance with the requirements of national systems set out in decision 19/CMP.1.

4. Changes to the national registry

84. Estonia provided information on changes to its national registry in its annual submission. Estonia reported that there were changes to its national registry since the previous annual submission. The major change reported related to Estonia's national registry joining the Consolidated System of European Union Registries (CSEUR) in 2012. Estonia described the change in its NIR, and in response to a question raised by the ERT during the review, the Party provided additional information in relation to this consolidation.

85. Estonia reported that there are changes in its national registry since the previous annual submission. The Party described the changes, specifically due to the centralization of the EU ETS operations into a single European Union registry operated by the European Commission called CSEUR, in its NIR (see p. 435ff). CSEUR is a consolidated platform which implements the national registries in a consolidated manner and was developed together with the new EU registry.

86. The ERT noted that there were recommendations in the SIAR that had not been addressed related to CSEUR, in particular recommendations related to reporting a description of the changes in the database structure and the reporting of test results. In response to questions raised by the ERT during the review, Estonia provided further confidential information on the changes to the national registry, including on a description of the changes in the database structure and the reporting of test results.

87. The ERT concluded that, taking into account the confirmed changes in the national registry, including the additional information provided to the ERT during the review, Estonia's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP). With respect to the provision of information related to the database structure specifically, the ERT encourages the Party to provide additional information in the NIR. The ERT recommends that Estonia include all other additional information in response to the SIAR findings in its NIR in accordance with decision 15/CMP.1, annex, chapter I.G.

5. Minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol

88. Estonia provided information on changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol in its annual submission. Estonia reported that there are changes since the previous annual submission. These changes include an update of the information regarding fast-start finance, an update of the information regarding the inclusion of aviation in the EU ETS and an update of the information regarding cooperation projects with developing countries. Estonia provided full descriptions of these changes and its activities directed to the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. The ERT concluded that, taking into account the confirmed changes in the reporting, the information provided is complete and transparent.

89. Estonia reported, in relation to the EU decision on the inclusion of aviation in the EU ETS in 2012, on it being an Administrative Member State for one aircraft operator from a developing country – Zambezi Airlines of Zimbabwe. Estonia funds and implements bilateral development cooperation projects for supporting the development of environmental protection institutions in developing countries, in particular in the field of water resource management and energy efficiency, as well as through support of international environmental organizations in their activities in supporting environmentally friendly development in developing countries. Under fast-start finance, Estonia is co-financing an action in Bhutan named "Global Climate Change Alliance – Climate Change Adaptation in the Renewable Natural Resources Sector", in cooperation with the European Commission.

III. Conclusions and recommendations

A. Conclusions

90. Table 7 summarizes the ERT's conclusions on the 2013 annual submission of Estonia, in accordance with the Article 8 review guidelines.

Table 7
Expert review team's conclusions on the 2013 annual submission of Estonia

		Paragraph cross-references
The ERT concludes that the inventory submission of Estonia is complete (categories, gases, years and geographical boundaries and contains both an NIR and CRF tables for 1990–2011)		
	Annex A sources[a]	Complete
	LULUCF[a]	Complete
	KP-LULUCF	Complete
The ERT concludes that the inventory submission of Estonia has been prepared and reported in accordance with the UNFCCC reporting guidelines		Yes
The submission of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision 15/CMP.1		Yes

		Paragraph cross-references
The Party's inventory is in accordance with the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*	Yes	
Estonia has reported information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol	Yes	Chapter II.G.1
Estonia has reported information on its accounting of Kyoto Protocol units in accordance with decision 15/CMP.1, annex, chapter I.E, and used the required reporting format tables as specified by decision 14/CMP.1	Yes	
The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1	Yes	
The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions	Yes	
Did Estonia provide information in the NIR on changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol?	Yes	89

Abbreviations: Annex A sources = sources included in Annex A to the Kyoto Protocol, CMP = Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, CRF = common reporting format, ERT = expert review team, IPCC = Intergovernmental Panel on Climate Change, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NIR = national inventory report, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

[a] The assessment of completeness by the expert review team considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the IPCC *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, or the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*).

B. Recommendations

91. The ERT identified the issues for improvement listed in table 8 below. All recommendations are for the next annual submission, unless otherwise specified.

Table 8
Recommendations identified by the expert review team

Sector	*Category*	*Recommendation*	*Paragraph references*
Energy	Sector overview	With regard to the EFs for CO_2 emissions from fuel combustion (all fuels), the NIR lists many EFs as country-specific, using the reference "CS, LT = D". In response to a question raised by the ERT, Estonia explained that this meant that the IPCC default EF used by Lithuania was applied in Estonia and	23

Sector	*Category*	*Recommendation*	*Paragraph references*
		considered a country-specific EF. The ERT disagrees with this approach and recommends that Estonia update the references	
		The ERT recommends that Estonia change the oxidation factor for LPG and recalculate the time series	24
	Comparison of the reference and sectoral approach	The ERT reiterates the recommendation from the previous review report that Estonia improve the consistency between the data reported to IEA and the data gathered at Statistics Estonia	27
	Country-specific issues	The ERT recommends that Estonia try to collect data on the carbon content of all fuel streams and prepare the carbon balance to verify that no fugitive losses occur during the process. Furthermore, the ERT recommends that Estonia translate the first column of the carbon balance spreadsheet into English to facilitate the review	30
	Stationary combustion: solid fuels – CO_2	The ERT recommends that Estonia provide information on the measurement requirements for the plants under the EU ETS and information on why the plants have reported different values to the inventory compilers and the EU ETS	31
	Road transportation: liquid fuels – CO_2	The ERT recommends that Estonia in the future apply QC checks to the data and investigate any outliers. Furthermore, the ERT recommends that Estonia provide in the NIR the information used to calculate the weighted EFs for the most recent year	32
	Civil aviation: liquid fuels – CO_2	The ERT recommends that Estonia revise the CO_2 EF for LTOs	33
	Road transportation: liquid fuels – CH_4 and N_2O	The ERT recommends that Estonia improve the trend discussion in the NIR, focusing on the key categories	34
	Fugitive emissions: oil – CH_4	The ERT recommends that Estonia report the notation key "NO" in CRF tables 1.B.2.a.iii and 1.B.2.a.iv, since the transport and storage of crude oil does not occur in Estonia. Furthermore, the ERT recommends that Estonia change the notation key for CRF table 1.B.2.a.v because the distribution of oil products does occur in Estonia	35
	Fugitive emissions: natural gas – CH_4	The ERT recommends that as data become available for future years, Estonia assess the possibility of revising the EF, taking into consideration the importance of time-series consistency	36
Agriculture	Manure management – CH_4 and N_2O	The ERT recommends that Estonia amend the incorrect reporting of the allocation structure of manure management systems for swine	49

Sector	*Category*	*Recommendation*	*Paragraph references*
		The ERT recommends that Estonia correct the copy and paste omission in the reporting of nitrogen excretion values for dairy cattle and fur-bearing animals	50
		The ERT recommends that Estonia report that there is dynamic nitrogen content in the feed of dairy cattle in appendix A.3.3_V of the NIR	51
	Agricultural soils – N_2O	The ERT recommends that Estonia correct the omission in the reporting of AD for pasture	52
		The ERT reiterates the recommendation made in the previous review report that Estonia revise its estimate of $Frac_R$ on the basis of national studies	53
LULUCF	Sector overview	The ERT recommends that Estonia separate gains and losses for all land uses	56
		The ERT identified an inconsistent use of the notation keys: "NE" was reported when the notation key "NA" would apply with regard to the reporting of land-use conversion to cropland. The ERT recommends that Estonia use the notation key "NA"	57
		The ERT reiterates the recommendation contained in the previous review report that Estonia provide more detailed information on the methodology used to estimate the carbon stock changes in any land converted to other land in the NIR	59
		The ERT recommends that Estonia include information on its capacity to detect the exact year of an occurrence of land-use change and its subsequent consistent representation in the time series, and report on any developments in identifying the exact year of the occurrence of land-use change	61
		The ERT recommends that Estonia subject the data on harvest volumes, deforestation or forest land converted o other land-use classes and mass of lime applied to further assessment by either QA or verification checks (or alternative means), and that Estonia report thereon in the NIR	64
	Forest land remaining forest land – CO_2	The ERT reiterates the recommendation made in the previous review report that Estonia explore ways of reducing the inter-annual fluctuations and report thereon	66
Waste	Solid waste disposal on land – CH_4	The ERT recommends that Estonia include information on the category "uncategorized disposal site" in the NIR	71
	Wastewater handling – CH_4	The ERT recommends that Estonia include information on the country-specific methane conversion factor	74
		The ERT recommends that Estonia include the information in support of the use of the lower Bo value in the NIR	
KP-LULUCF	Afforestation and reforestation	The ERT identified that the net carbon stock change in dead wood is reported as "NO" for units of afforestation and	77

Sector	*Category*	*Recommendation*	*Paragraph references*
	– CO_2	reforestation. In response to a request made by the ERT during the review to provide transparent and verifiable information to demonstrate that the pool is not a net source of emissions, Estonia replied that the national forest inventory data reveal that no dead wood is present in afforested and reforested areas, and that it would be a sink with regard to tree growth. The ERT recommends that Estonia demonstrate the assumption that no dead wood is present in afforested and reforested areas through the provision of transparent and verifiable information showing that the pool is not a source	
		The ERT recommends that Estonia include the information on units of land harvested in afforestation and reforestation activities since the beginning of the commitment period, including verifiable information that is sufficient (and transparent) in justifying that the carbon pool is not a net source of emissions	78
	Afforestation, reforestation and deforestation – CO_2	The ERT recommends that Estonia assess the impact of the application of different forest definitions, specifically for afforested and reforested land, and utilize the results of this assessment to correct the area of afforestation, reforestation and deforestation obtained from the Statistics Estonia data, and report thereon in the NIR	79
National registry		The ERT recommends that Estonia report any changes in its national registry in accordance with decision 15/CMP.1, annex, chapter I.G	87

Abbreviations: AD = activity data, Bo = maximum methane producing capacity, CRF = common reporting format, EFs = emission factors, ERT = expert review team, EU ETS = European Union emissions trading scheme, $Frac_R$ = fraction of total above-ground crop biomass that is removed from the field as a crop product, IEA = International Energy Agency, IPCC = Intergovernmental Panel on Climate Change, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LPG = liquefied petroleum gas, LTO = landing and take-off, LULUCF = land use, land-use change and forestry, NIR = national inventory report, NA = not applicable, NE = not estimated, NO = not occurring, QA = quality assurance, QC = quality control.

IV. Questions of implementation

92. No questions of implementation were identified by the ERT during the review.

Annex I

Background data on recalculations and information to be included in the compilation and accounting database

Table 9
Recalculations in the 2013 annual submission for the base year and the most recent year

Greenhouse gas source and sink categories	*1990*	*2010*	*1990*	*2010*	*Reason for the recalculation*
	Value of recalculation (Gg CO_2 eq)		*Per cent change*		
1. Energy	14.42	–417.25	0.0	–2.3	Improved EFs and AD
A. Fuel combustion (sectoral approach)	14.42	–417.25	0.0	–2.3	
1. Energy industries	46.61	–405.47	0.2	–2.8	
2. Manufacturing industries and construction	–0.20	–0.02	–0.0	–0.0	
3. Transport	–31.11	–11.81	–1.2	–0.5	
4. Other sectors	–0.82	0.05	–0.0	0.0	
5. Other	–0.07		–0.1		
B. Fugitive emissions from fuels					
1. Solid fuels					
2. Oil and natural gas					
2. Industrial processes	0.31	0.06	0.0	0.0	Improved AD
A. Mineral products	0.31	0.06	0.0	0.0	
B. Chemical industry					
C. Metal production					
D. Other production					
E. Production of halocarbons and SF_6					
F. Consumption of halocarbons and SF_6					
G. Other					
3. Solvent and other product use	5.67	–0.26	27.3	–1.5	Improved AD
4. Agriculture	–162.14	–52.17	–4.9	–4.0	Improved EFs and AD
A. Enteric fermentation	–137.04	–41.32	–11.9	–9.2	
B. Manure management	–0.26	0.84	–0.1	0.6	
C. Rice cultivation					
D. Agricultural soils	–24.84	–11.69	–1.4	–1.6	
E. Prescribed burning of savannas					
F. Field burning of agricultural residues					
G. Other					
5. Land use, land-use change and forestry	500.14	–2 183.88	–5.3	58.1	Improved EFs and AD
A. Forest land	76.67	–2 837.53	–0.8	70.7	

Greenhouse gas source and sink categories	*1990*	*2010*	*1990*	*2010*	*Reason for the recalculation*
	Value of recalculation (Gg CO_2 eq)		*Per cent change*		
B. Cropland	–16.73	95.59	–11.8	92.6	
C. Grassland	322.43	321.32	–149.6	–199.9	
D. Wetlands	117.77	142.26	905.0	979.1	
E. Settlements		25.49		8.5	
F. Other land		68.98		100.0	
G. Other					
6. Waste	–37.30	–79.45	–9.8	–14.9	Improved EFs and AD
A. Solid waste disposal on land	–1.90	–5135	–1.0	–15.9	
B. Wastewater handling	–35.43	–30.36	–18.1	–42.7	
C. Waste incineration	0.03		1.7		
D. Other		2.26		1.6	
7. Other					
Total CO_2 equivalent without LULUCF	**–179.05**	**–552.84**	**–0.44**	**–2.7**	
Total CO_2 equivalent with LULUCF	**321.09**	**–2 736.73**	**1.02**	**–16.3**	

Abbreviations: AD = activity data, EFs = emission factors, LULUCF = land use, land-use change and forestry, NA = not applicable.

Table 10
Information to be included in the compilation and accounting database in t CO_2 eq for 2011, including the commitment period reserve

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Commitment period reserve	104 777 884			104 777 884
Annex A emissions for 2011				
CO_2	18 832 989			18 832 989
CH_4	957 422			957 422
N_2O	1 003 971			1 003 971
HFCs	159 379			159 379
PFCs	NA, NE, NO			NA, NE, NO
SF_6	1 816			1 816
Total Annex A sources	**20 955 577**			**20 955 577**
Activities under Article 3, paragraph 3, for 2011				
3.3 Afforestation and reforestation on non-harvested land for 2011	–145 007			–145 007
3.3 Afforestation and reforestation on harvested land for 2011	NA, NO			NA, NO
3.3 Deforestation for 2011	377 118			377 118
Activities under Article 3, paragraph 4, for 2011[c]				
3.4 Forest management for 2011				
3.4 Cropland management for 2011				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2011				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2011				
3.4 Revegetation in the base year				

Abbreviations: NA = not applicable, NE = not estimated, NO = not occurring.
[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).
[b] "Final" includes revised estimates, if any, and/or adjustments, if any.
[c] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 11
Information to be included in the compilation and accounting database in t CO_2 eq for 2010

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2010				
CO_2	17 801 494			17 801 494
CH_4	1 016 843			1 016 843
N_2O	1 016 054			1 016 054
HFCs	152 565			152 565
PFCs	NA, NE, NO			NA, NE, NO
SF_6	1 811			1 811
Total Annex A sources	**19 988 767**			**19 988 767**
Activities under Article 3, paragraph 3, for 2010				
3.3 Afforestation and reforestation on non-harvested land for 2010	−131 074			−131 074
3.3 Afforestation and reforestation on harvested land for 2010	NA, NO			NA, NO
3.3 Deforestation for 2010	475 738			475 738
Activities under Article 3, paragraph 4, for 2010[c]				
3.4 Forest management for 2010				
3.4 Cropland management for 2010				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2010				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2010				
3.4 Revegetation in the base year				

Abbreviations: NA = not applicable, NE = not estimated, NO = not occurring.
[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).
[b] "Final" includes revised estimates, if any, and/or adjustments, if any.
[c] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 12
Information to be included in the compilation and accounting database in t CO_2 eq for 2009

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2009				
CO_2	14 157 890			14 157 890
CH_4	984 495			984 495
N_2O	979 607			979 607
HFCs	138 145			138 145
PFCs	NA, NE, NO			NA, NE, NO
SF_6	1 440			1 440
Total Annex A sources	**16 261 577**			**16 261 577**
Activities under Article 3, paragraph 3, for 2009				
3.3 Afforestation and reforestation on non-harvested land for 2009	–121 261			–121 261
3.3 Afforestation and reforestation on harvested land for 2009	NA, NO			NA, NO
3.3 Deforestation for 2009	638 435			638 435
Activities under Article 3, paragraph 4, for 2009[c]				
3.4 Forest management for 2009				
3.4 Cropland management for 2009				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2009				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2009				
3.4 Revegetation in the base year				

Abbreviations: NA = not applicable, NE = not estimated, NO = not occurring.
[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).
[b] "Final" includes revised estimates, if any, and/or adjustments, if any.
[c] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 13
Information to be included in the compilation and accounting database in t CO_2 eq for 2008

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2008				
CO_2	17 357 712			17 357 712
CH_4	1 053 771			1 053 771
N_2O	1 073 488			1 073 488
HFCs	131 312			131 312
PFCs	38			38
SF_6	1 350			1 350
Total Annex A sources	**19 617 671**			**19 617 671**
Activities under Article 3, paragraph 3, for 2008				
3.3 Afforestation and reforestation on non-harvested land for 2008	–97 883			–97 883
3.3 Afforestation and reforestation on harvested land for 2008	NA, NO			NA, NO
3.3 Deforestation for 2008	721 526			721 526
Activities under Article 3, paragraph 4, for 2008[c]				
3.4 Forest management for 2008				
3.4 Cropland management for 2008				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2008				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2008				
3.4 Revegetation in the base year				

Abbreviations: NA = not applicable, NO = not occurring.
[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).
[b] "Final" includes revised estimates, if any, and/or adjustments, if any.
[c] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Annex II

Documents and information used during the review

A. Reference documents

Intergovernmental Panel on Climate Change. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>.

Intergovernmental Panel on Climate Change. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gp/english/>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.htm>.

"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories". FCCC/SBSTA/2006/9. Available at <http://unfccc.int/resource/docs/2006/sbsta/eng/09.pdf>.

"Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention". FCCC/CP/2002/8. Available at <http://unfccc.int/resource/docs/cop8/08.pdf>.

"Guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol". Decision 19/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=14>.

"Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol". Decision 15/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf#page=54>.

"Guidelines for review under Article 8 of the Kyoto Protocol". Decision 22/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=51>.

Status report for Estonia 2013. Available at <http://unfccc.int/resource/docs/2013/asr/est.pdf>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2013. Available at <http://unfccc.int/resource/webdocs/sai/2013.pdf>.

FCCC/ARR/2012/EST. Report of the individual review of the greenhouse gas inventory of Estonia submitted in 2012. Available at <http://unfccc.int/resource/docs/2013/arr/est.pdf>.

UNFCCC. *Standard Independent Assessment Report*, parts I and II. Available at <http://unfccc.int/kyoto_protocol/registry_systems/independent_assessment_reports/items/4061.php>.

B. Additional information provided by the Party

Responses to questions during the review were received from Ms. Anne Mändmets (Ministry of Environment), including additional material on the methodologies and assumptions used.

Annex III

Acronyms and abbreviations

A/R	afforestation/reforestation
AD	activity data
BEF	biomass expansion factor
CH_4	methane
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CRF	common reporting format
CSEUR	Consolidated System of European Union Registries
DOC	degradable organic carbon
D	deforestation
EF	emission factor
ERT	expert review team
EU ETS	European Union emissions trading scheme
F-gas	fluorinated gas
$Frac_R$	fraction of total above-ground crop biomass that is removed from the field as a crop product
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 without GHG emissions and removals from LULUCF
HFCs	hydrofluorocarbons
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
kg	kilogram (1 kg = 1,000 grams)
KP-LULUCF	land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
LPG	liquefied petroleum gases
LTO	landing and take-off
LULUCF	land use, land-use change and forestry
N	nitrogen
N_2O	nitrous oxide
NA	not applicable
NE	not estimated
NFI	National Forest Inventory
NIR	national inventory report
NO	not occurring
PFCs	perfluorocarbons
PJ	petajoule (1 PJ = 1015 joule)
QA/QC	quality assurance/quality control
SEF	standard electronic format
SF_6	sulphur hexafluoride
SIAR	standard independent assessment report
TJ	terajoule (1 TJ = 1012 joule)
UNFCCC	United Nations Framework Convention on Climate Change